Thought Question

John is given a few minutes to study this list of visual words:

banana, subway, newspaper, cotton, lighthouse, JAR, vacuum, eye, HOUSE, diamond, llama, museum, ticket

Which words is he most likely to recall an hour later? Why?

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Long Term Memory

Retention and Retrieval

How can we retrieve memories from long term memory?

- **We have already seen that part of the answer depends on:**
  - **encoding:** amount, organization, distinctiveness
  - **match between encoding and retrieval:** transfer appropriate processing, context
- **What happens in extreme cases?**
  - amnesia

Amnesia: Causes

- **Damage to medial temporal lobe**
  - often, the **hippocampus**
- **Examples**:
  - anoxia (loss of oxygen)
  - HM: surgery
  - Clive Wearing: herpes simplex encephalitis

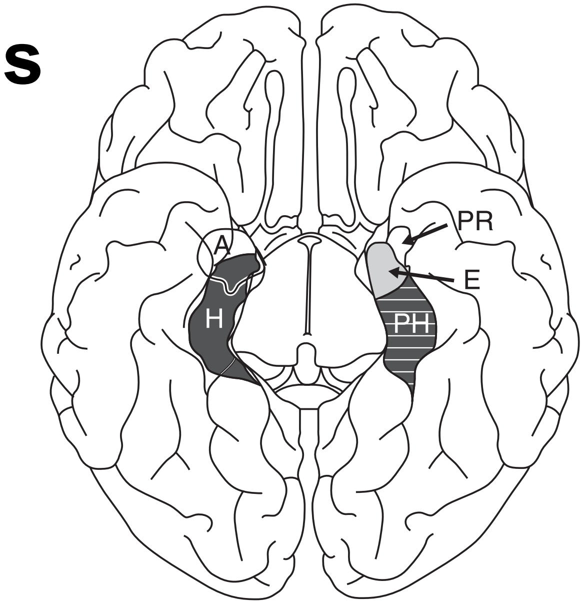

FIGURE 3 | Medial temporal lobe (MTL) structures viewed from the underside of the brain. A, amygdala; E, entorhinal cortex; H, hippocampus; PH, parahippocampal cortex; PR, perirhinal cortex. (Reprinted with permission from Ref 27. Copyright 2005 John Wiley & Sons, Ltd.)

Types of Amnesia

- Amnesia: Selective loss of long-term memory (short-term memory okay)

- **Retrograde amnesia**
  - Amnesia for events that preceded some disturbance to the brain
- **Anterograde amnesia**
  - Amnesia for events that occur after some disturbance to the brain

Types of Amnesia

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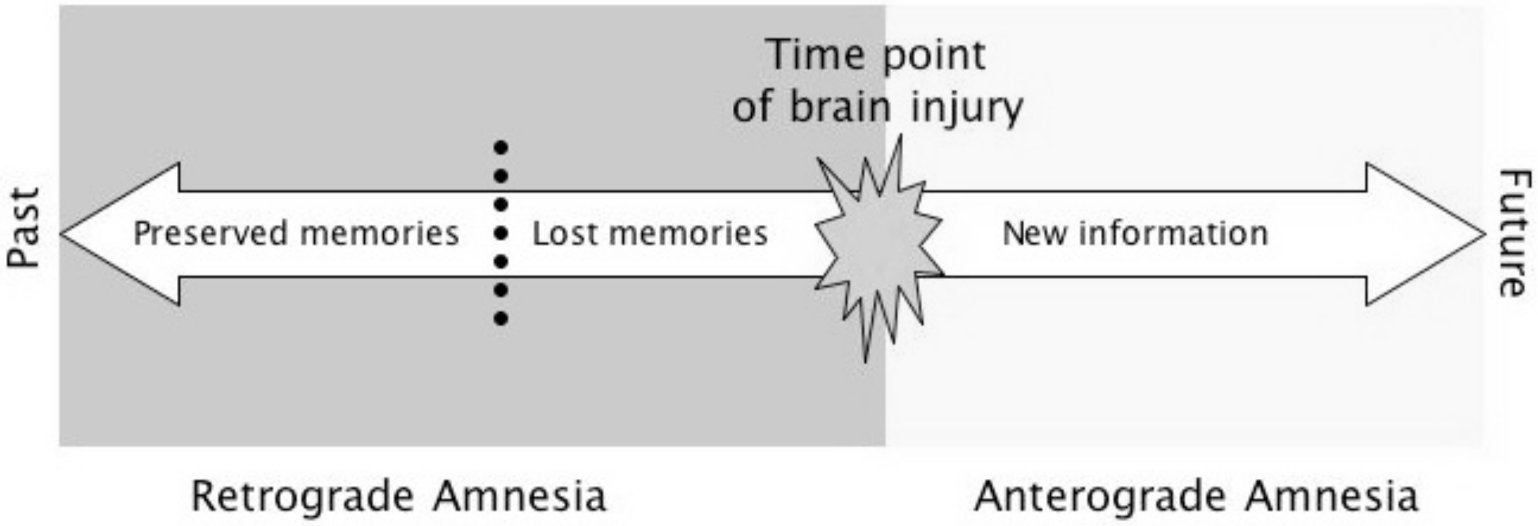
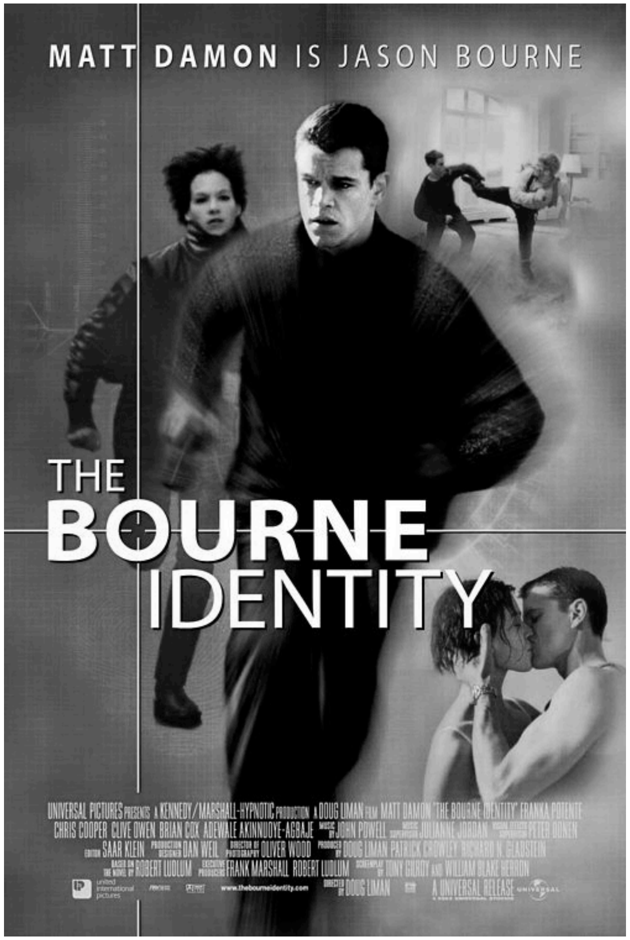


Retrograde


MATT DAMON IS JASON BOURNE
THE BOURNE IDENTITY

Anterograde

Retrograde Amnesia

- Can form new declarative memories, but lose some old declarative memories
- Characteristics:
  - Variable time -- may lose decades of memories or only a week or so.
  - Most likely to recover oldest memories.
  - Typically spares “overlearned” material: language, social skills, general intelligence.
  - Doesn’t affect procedural memory.

Anterograde Amnesia

- Can remember events prior to injury, but cannot form new declarative memories.
- Characteristics:
  - Short-term memory (a few minutes) is fine.
  - All modalities are affected.
  - Does not affect procedural memory (can learn new skills).
  - Temporal gradient – also see memory loss for events a few years prior to injury.

What amnesia tells us . . .

- Supports a distinction between declarative and non-declarative memory.
- Supports a distinction between the processes involved in forming a memory and the representations that are eventually formed.
- Suggests a consolidation *process* that takes several years to complete.

Normal memory problems

- Although long-term memory has a high capacity and can last a lifetime, we don’t remember everything.
  - We fail to retrieve information when we want to (remember answer after test).
  - We retrieve inaccurate information.
  - We fail to forget things we might wish to.

“Seven Sins” of Memory (Schacter)

- Absent-mindedness (fail to encode)
- Transience (decay)
- Blocking (failure to retrieve)
- Misattribution (mix up parts)
- Suggestibility (make up information)
- Bias (distort to fit preconceptions)
- Persistence (can’t stop recalling)

Measures of retrieval

- Recall
- Cued recall
- Recognition
  - recollection
  - familiarity

Explicit

- Explicit measures ask people to make overt reference to their memory.

Measures of retrieval

- Savings from learning
- Performance measures
  - priming (faster to respond)
  - word completion
- Physiological measures
  - eye movements
  - ERPs

Implicit

- Implicit measures DO NOT ask people to make reference to memory.

Measures of retrieval

- **Different measures = different results!**
  - recall hardest
  - better with cue for recall
  - better still for recognition
- **Implicit measures sometimes show evidence for memory that cannot be found with explicit measures.**
- **Different factors influence explicit and implicit tests. See different errors.**

Explicit vs. implicit: Example

- Jacoby and Dallas (1981)
- Three study conditions:
  - letter judgment
  - rhyme judgment
  - meaning judgment
- Two test conditions:
  - recognition
  - perceptual identification (see word for 35 ms and must report it)

Explicit vs. implicit: Example

Results:

- Recognition (explicit task)
  - semantic > rhyme > letter
  - levels of processing
- Perceptual identification (implicit task)
  - general priming (identify words you have seen better)
  - BUT, no effect of levels of processing!

When implicit fails . . .

- Jacoby et al. (1989)
- Get list of names to remember (told that none are famous names).
- Some time later, given second list and must rate how famous the person is.
  - moderately famous names (Christopher Wren, Satchel Paige)
  - names from list
  - new names
- Second test either shortly after study or 24 hours later.

When implicit fails . . .

Results

- At the short delay, subjects can differentiate famous names from familiar, non-famous names.
- After 24 hours, strong tendency to rank studied, non-famous names as famous.
- “Famous overnight” experiment.

- **People can misattribute familiarity.**
- **Other studies show that people likely to believe that familiar things are true.**

When implicit succeeds . . .

- Implicit memory more rigidly linked to original stimulus and context.
- For example, study auditory word list
  - Good recognition for visual words
  - ➢ **explicit memory doesn't care about modality change**
  - test perceptual ID – little effect of prior exposure
  - ➢ **implicit memory depends on modality and other perceptual characteristics**

When implicit succeeds . . .

- Sometimes care about specific details
- Eyewitness situation – person in lineup looks similar to actual criminal
  - explicit recognition: “close enough!”
  - implicit measures (eye movements, ERPs): “not exactly the same”

Summary

- Different *types* of memory
  - short/long term
  - declarative/nondeclarative
  - explicit/implicit
- Why do we care?
  - might want different strategies for getting information in and out of these systems
  - provides cross-check for situations where accuracy is very important
  - want to have accurate models of memory

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Blocking

- Refers to a failure to be able to retrieve information that we *know* is stored in the system.
- Transient failure – can recall that information at a later time.
- Common example: can't think of a word ("Tip of the Tongue" state).

Tip of the tongue

What are the words for . . .

- a stone having a cavity lined with crystals
- worthy of respect or reverence by reason of age and dignity
- shedding leaves each year, as opposed to evergreen
- a person appointed to act as a substitute for another
- flying dinosaur from the Mesozoic Era
- five offspring born at a single birth

Tip of the tongue

Answers

geode: a stone having a cavity lined with crystals

venerable: worthy of respect or reverence by reason of age and dignity

deciduous: shedding leaves each year, as opposed to evergreen

surrogate: a person appointed to act as a substitute for another

pterodactyl: flying dinosaur from the Mesozoic Era

quintuplets: five offspring born at a single birth

Tip of the tongue

- Fail to retrieve a word that you are certain you know.
- Often can get some partial information about the word
  - initial sound (50-70% of time)
  - approximate length
- Names are a very common type of item to have blocking for.

The Baker/baker paradox

- Learn to associate a label with a set of unfamiliar faces.

BAKER

FARMER

SHEPHERD

The Baker/baker paradox

- Two types of labels, but actual word the same:
  - name (e.g., “Baker”)
  - occupation (e.g., “baker”)
- At test, get face and try to give label.
- Recall higher for occupations than names, even though the label is the SAME WORD!

Explaining the paradox

- Why should it be harder to retrieve a name than an occupation?

- Proper names don't tell you anything about the person.
  - Less opportunity for elaboration.

- Common strategy for learning names is to associate with conceptual information.

Repression: a kind of blocking?

- Can blocking occur for important, autobiographical experiences?

Studying repression

- Give subject list of words to learn:
  - apple, canary, robin, pear, crow, banana
- At test, give some of the words from the list (e.g., pear, canary) and ask people to free-recall others.
  - better performance?
  - no, paradoxically, WORSE performance!
- Calling to mind some information inhibits other, related information.

Studying repression

- Implications for eye-witness testimony
  - being asked about some aspects of crime can make it more difficult for witness to bring to mind other aspects.
  - show experimentally, by having people study crime scene, asking them about some details, and then testing memory
    - better recall for details that were queried
    - worse recall for those that were not

So is there repression?

- Experimental evidence suggests that sometimes memories are blocked and can be difficult to retrieve.
- Whether this occurs for significant events, and whether blocking can last for a long time (years) is controversial.
- For individual cases, important to also consider other types of memory issues, as in next lecture …

Thought Question

Participants are asked to study a set of word pairs. In one condition (A) they are asked to decide for each pair whether the words are presented in alphabetical order (e.g., happy - delighted; NO). In another (B) they are asked to decide whether the words have similar meaning (e.g., happy - delighted; YES). They are then given two tests. In TEST 1, they are provided the first word of the pair and asked to recall the second. In TEST 2, they are given a word stem completion task (e.g., “fill in d__________ with the first word that comes to mind”). What pattern do you expect to see?